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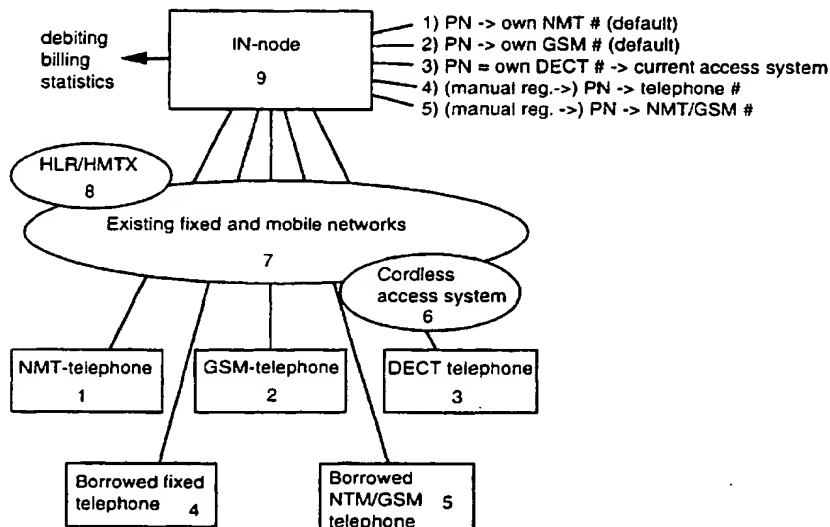
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## (54) Personal number communications system

(57) The invention relates to a device and a procedure at a telecommunications system (7) which makes possible the introduction of a general personal telephone number which functions in both fixed and mobile networks (7) as well as in cordless access systems (6) connected to these networks (7). A condition for this personal number is a central network node (9) located at, or in connection to, these telecommunications networks (7), preferably PSTN, ISDN, GSM, NMT, without influencing network functions, numbering schemes, termi-

nals in these networks (7). At a call to a subscriber located in just any telecommunications network (7) the call, independent of from which telecommunications network (7) the call emanates, is connected to this central network node (9) which converts the received personal number to the specific number corresponding to the telecommunications network at which the subscriber has registered himself/herself, whereafter said network node (9) executes connection of said call to the current access point which corresponds to said specific number.

Figure 1



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## Description

### TECHNICAL FIELD

The present invention relates to a device and a procedure at a telecommunications system and data communications system which makes possible the introduction of a general personal telephone number which functions in both fixed and mobile networks as well as in cordless access systems connected to previously mentioned communications network.

### PRIOR ART

Today all telephone networks have numbers which are related to a fixed access point (a telephone jack), a certain terminal (NMT-telephone) or possibly a certain card (GSM:s SIM-card). The different networks have number series of their own, also the mobile telephone networks have among themselves number series of their own; in Sweden for instance 010 for NMT, and 0705 for Telia's GSM.

Before long, functions will turn up in the fixed networks which support mobility of cordless telephones between cordless access systems (for instance DECT), called CTM (Cordless Terminal Mobility). A specific terminal identity is used at incoming calls to the terminal and to identify the terminal at outgoing calls. This identity must follow the numbering schemes which are used in the fixed networks (E. 164).

The users, however, don't want to keep in mind a set of numbers depending on where the wanted person is or which terminal he/she is using at the moment. A number which uniquely identifies the user, a personal number, is required.

Within ETSI and ITU an international standard for personal numbers is under completion; Universal Personal Telecommunications service (UPT). Here the user and not the terminal has a unique identity of its own. Phase one which is concentrated on the fixed network (PSTN) has been completed during 1994. The specification of phase two, which also includes GSM, has recently started. Because the fixed networks are lacking mobility functions, and for other technical and safety reasons, complicated user procedures, tone transmitters etc are required. Since UPT phase 1 is restricted to the fixed networks, the UPT-number must in the same way as is described above, follow the numbering scheme which is valid there (E. 164) and be located to a number serie of its own.

The use of cards for registration and use of services will improve the user interface. Today there are SIM-cards for GSM, and before long the equivalent to DECT, DAM will be approved as European standard. A special UPT-card is under construction, and ETSI's work group TE9 has produced a standard for multi-application cards for, for instance telecommunications and bank services. The coordination between these standards has been ar-

ranged but complete compatibility does not exist. That consequently implies one card for each network/service.

The mobile telephone networks' equivalent to personal numbers is GSM's SIM (Subscriber Identity Module), but also this only allows that the own network, or the networks of "allied" operators, can be accessed, and only with a GSM telephone.

To sum up one can say that the fixed telephone networks of today have telephone numbers related to a certain place, and the mobile telephone systems of today have telephone numbers related to a certain terminal or card. A network service which allows that cordless telephones can be used in many places, public and private, is under standardization. Also here the number is related to a certain terminal or a certain card. A standardized personal telephone number is "universal" and shall in the long run function in all systems and terminals, which makes the user procedures complicated and the standardization work slow.

The aim with the present invention is to introduce a general personal telephone number which functions in all fixed and mobile networks as well as in cordless access systems connected to these networks. Further aims with the present invention is to simplify (automatize as far as possible and in an appropriate way) the user procedures, at least at the use of personal number in own mobile or cordless terminal, and to rapidly meet the demands of the market by preceding the slow standardization work and at the same time create competition advantage by concrete, specific solutions.

### Summary of the invention

The invention relates, as has been mentioned above, to create one for each subscriber general personal number which can be used in all existing telecommunications networks and in cordless access systems connected to these networks. This is achieved by placing a central network node at, or in connection to, existing networks including a personal number which defines one for respective subscriber user specific service profile. In the node are in addition stored for instance current routing address, addresses to a personal voice mail box and other existing services, as well as necessary administrative information such as debiting parameters, invoice addresses etc.

At call to the subscriber the call, independent of from which type of network the call emanates, is connected to the central network node which converts the received number to the number the subscriber has registered himself/herself at, whereafter the central network node executes connection towards the current access point in the network. By that is achieved one for the subscriber personal subscriber number, where he/she can be reached by calls independent of to which telecommunications network the subscriber is connected. Further, the central network node identifies a user at outgoing

calls by the related terminal identity and by that allows a collected debiting.

The invention consequently gives the network operator possibility, in the existing mobile telephone networks, for instance NMT, GSM (without influencing network functions, numbering schemes or terminals), in fixed networks, for instance PSTN, ISDN for fixed and cordless access, for instance DECT with addition of a central network node and only at manual registration by means of the user procedures, to offer the customer a personal number for all mobile and fixed services and a collected debiting.

Further characteristics of the present invention are indicated more in detail in the following patent claims.

The invention will now be described in more details below with reference to the enclosed drawings.

#### Short description of the drawings

Figure 1 shows schematically the central network node and the existing telecommunications systems.

Figure 2 shows schematically the architecture of the network node and the existing telecommunications systems.

#### Description of a number of scenarios and detailed description of a technical realization of the invention

Network operators shall be able to offer the customer a number which can be used in both NMT and GSM, as well as in DECT and fixed telephones. A number of scenarios will now describe the different possibilities.

A customer has an NMT-telephone 1 as his/her normal access (default routing access). With a personal number he/she need not do anything special to use it (and be debited), neither at incoming or outgoing calls. Registration is not required, since the central network node in the normal position or in the "default"-position is adjusted to or related to a terminal identity 1,2 in NMT or GSM.

Another customer has a GSM-telephone 2 as his/her normal access. When he/she uses his/her own or a borrowed GSM-telephone, he/she uses his/her SIM-card, at which the central network node 9 directly relates this telephone to his/her personal number. In the same way as is described above, no special user procedures, telephones or new network functions in addition to the central network node 9, are required.

The customer also can have a cordless telephone 3. When it comes into the coverage area of a cordless access system 6 an automatic registration process can be initiated, at which current registration address is changed in the central network node 9 from the mobile telephone to the access system 6. No user procedures are required.

The customers also can register themselves at a borrowed fixed or cordless telephone 3, NMT-telephone 1 or GSM-telephone 2 with somebody else's SIM-card

for incoming or occasional outgoing calls (and personal debiting) by manual registration. In this case is needed that the customer actively informs the central network node 9 where he/she is, for instance at fixed telephone by manually keying a code on the keyset. Consequently extended user procedures are here required. One way to simplify the user's handling is to use a number transmitter. This can be a separate unit or the abbreviated number memory of the own telephone. In principle number transmitter is not required, but the amount of figures which are transmitted is extraordinary big, and the procedure is not user friendly.

The personal number is used as identification of the subscriber and by that functions as account number and the customer can get a collected debiting from the mobile telephone operator for all his/her services in fixed and mobile networks.

A condition for the general personal number is a central network node 9 (suitably according to IN-technology; Intelligent Network) in the network. It constitutes the heart in the concept where the personal number is created, is related to terminal identities and is administered.

The personal number defines a personal service profile which is stored in the network node and which can be accessed by the customer for certain modification. Here normal or current routing address is stored, addresses to a personal mail box and other services, as well as administrative information such as debiting information, invoice address etc.

Due to the fact that the execution of the service is managed by the IN-node, the introduction of the personal number need not influence the fixed NMT- or GSM-networks of today. Fixed telephones, NMT-telephones and SIM-cards preserve their identities. At an incoming call conversion is made from the keyed (personal) number to current number (NMT-, GSM- fixed or cordless telephone) in the network node. At outgoing calls the user of the NMT-telephone, the SIM-card, the cordless telephone (or its DAM-card) or the identification- and authentication procedure which is managed by the number transmitter is defined.

Two changes of the network of today which gives a more efficient mobility management relate to the possibility to direct communication between the network node 9 and GSM's HLR 8, respective NMT's HMTX 8, and the introduction of a new functionality in AXE local station, called MMF (Mobility Management Function). In addition the IN-node should be separated in a central (home) node, and a number of local (visiting) nodes. This is well in accordance with Telia's IN-strategy.

The first change is restricted and comparatively easy to realize, whereas the second one is more expensive due to the big number of local stations which are upgraded. The procedures which will be described later presuppose the two changes. The functional architecture which is implied for the cordless access is described below with reference to Figure 2.

The functionality for mobility in public fixed networks is localized to separate IN-nodes and/or in the local and transit exchanges (LX respective FX). At short sight SSF-functionality will exist in FX, but in the long run there will also be a possibility to place it in certain or all LX. There are advantages and disadvantages with all these alternatives, but here the last alternative has been chosen.

In the local stations are in addition to CCF, SSF and SRF a functional unit for management of CTM (MMF).

Two levels of IN-nodes are also included in the architecture, i.e. SCF/SDFV and SCF/SDFH (see Figure 2). These manage local (visit, temporary) respective central (home, permanent) service control and data management for mobile users.

Two access forms are included in the architecture. CCAF is realized in a conventional keyset code telephone for personal mobility and CSF/CLCF is realized in a cordless access system (FT) for terminal mobility. The PT-functionality exists in the cordless terminal.

Below is described a number of procedures for the above mentioned scenarios:

Automatic registration of personal number/cordless telephone number in cordless access system.

Incoming call to personal number/cordless telephone number registered in cordless access system.

Outgoing call from personal number/cordless telephone registered in cordless access system.

Manual registration of personal number at borrowed fixed telephone.

Incoming call to personal number registered at borrowed fixed telephone.

Outgoing call from personal number registered at borrowed fixed telephone.

These procedures describes the information which flows between involved network nodes. They intend to give a somewhat more than detailed description of the invention and its influence on network functions and user procedures.

The first three cases imply cordless telephony and cordless access system according to the DEC-standard (GAP-compatible) and communication with the IN-node, which is called CTM (Cordless Terminal Mobility).

It should be emphasized that no procedures for management of the personal number are performed in the mobile telephone system, as no such specific handling as we know according to what has been described is performed.

What has been described above of the present invention is only to be regarded as example and the invention is only restricted by what is indicated in the patent claims.

## Claims

1. Procedure to call a subscriber located in just any telecommunications network (7), preferably PSTN,

ISDN, GSM, NMT, or who utilizes cordless access systems (6), preferably DECT, connected to said telecommunications network by using a general personal number **characterized** in that at call to the subscriber the call, independent of from which telecommunications network the call emanates, is connected to a central network node (9) which converts the received personal number to the specific number corresponding to the telecommunications network at which the subscriber has registered himself/herself, after which said network node (9) executes connection of said call to the current access point which corresponds to said specific number.

2. Procedure according to claim 1, **characterized** in that the central network node (9) is placed at, or in connection to, existing telecommunications network (7) without influencing network functions, numbering schemes, terminals in said telecommunications network (7).
3. Procedure according to claim 2, **characterized** in that the central network node (9) utilizes the automatic registration functions of the mobile telephone networks and the cordless telephone systems for simplified management.
4. Procedure according to claim 1, **characterized** in that the central network node (9) in the normal case ("default") relates the personal number to a terminal identity (1, 2) in NMT or GSM.
5. Procedure according to claim 1, **characterized** in that the central network node (9) relates the personal number to a current access point in a cordless access system (6) at automatic registration of a cordless telephone (3) in the access system (6).
6. Procedure according to claim 1, **characterized** in that the central network node (9) relates the personal number to a current fixed access point, for instance telephone jack, at manual registration.
7. Procedure according to any of the previous claims, **characterized** in that the central network node (9) manages number conversion from the dialled number to a related mobile terminal identity, related cordless or related fixed access point at incoming calls.
8. Procedure according to any of the previous claims, **characterized** in that the central network node (9) identifies a user at outgoing call by the related terminal identity (1, 2, 3, 4, 5) and by that allows a collected debiting.

9. Procedure according to any of the previous claims, **characterized** in that a direct communication is realized between the central network node and HLR of the GSM, respective HMTX of the NMT, to achieve a more efficient mobility management. 5
10. Procedure according to any of the previous claims, **characterized** in that a new functionality called MMF (Mobility Management Function) is introduced in the AXE local station to get a more efficient mobility management. 10
11. Device for introduction of one for each subscriber general personal number for use in all existing telecommunications networks (7), preferably PSTN, ISDN, GSM, NMT and in cordless access systems (6) preferably DECT, connected to said telecommunications network (7) **characterized** in that the device consists of a central network node (9) which is placed at, or in connection to, existing telecommunications network (7) without influencing network functions, numbering schemes, terminals in said network (7) at which at call from a subscriber, located in just any telecommunications network (7) or who utilizes cordless access systems (6) connected to said telecommunications network (7), to another subscriber located in the same telecommunications network (7)/cordless access system (6), or in another telecommunications network (7)/cordless access system (6), the call is connected to said central network node (9) arranged to convert the received personal number to the specific number corresponding to the telecommunications network at which the called subscriber has registered himself/herself, whereafter said central network node (9) is arranged to execute connection of said call to the current access point which corresponds to the specific number of the called subscriber. 15  
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12. Device according to claim 11, **characterized** in that said central network node (9) includes said personal number which defines one for respective subscriber user specific service profile at which said node (9) further includes information of current "routing"-addresses, addresses to personal mail boxes and other existing services as well as necessary administrative information such as debiting parameters, invoice addresses etc. 45  
50
13. Device according to any of the claims 11-12, **characterized** in that said central network node in the normal case ("default") is arranged to relate the personal number to a terminal identity (1, 2) in NMT or GSM. 55
14. Device according to any of the claims 11-13, **characterized** in that said central network node (9) is arranged to relate the personal number to a current access point in a cordless access system (6) at automatic registration of a cordless telephone (3) in the access system (6).
15. Device according to any of the claims 11-14, **characterized** in that said central network node (9) is arranged to relate the personal number to a current fixed access point, for instance telephone jack, at manual registration.
16. Device according to any of the claims 11-15, **characterized** in that said central network node (9) is an IN-node.
17. Device according claims 15, **characterized** in that two levels of IN-nodes (9) are utilized, i.e. SCF/SDFv and SCF/SDFh arranged for management of local respective central service controls and data management for mobile users, preferably in cordless access systems (6).

Figure 1

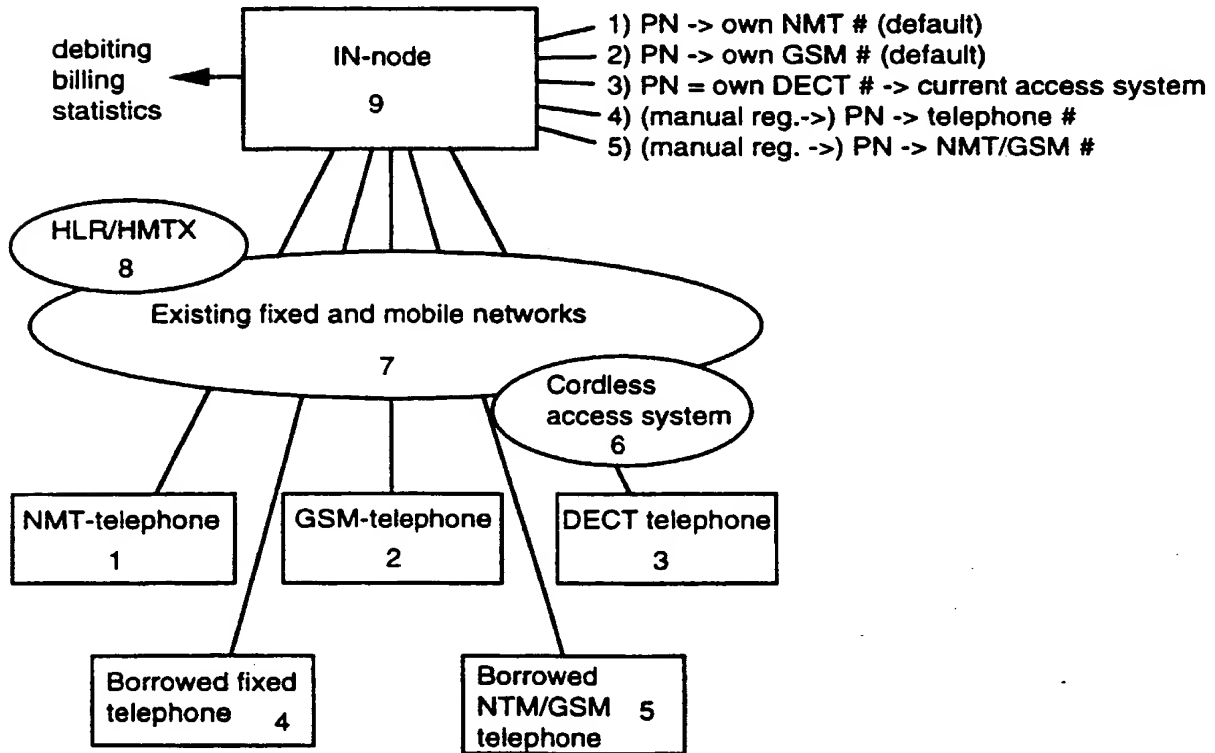
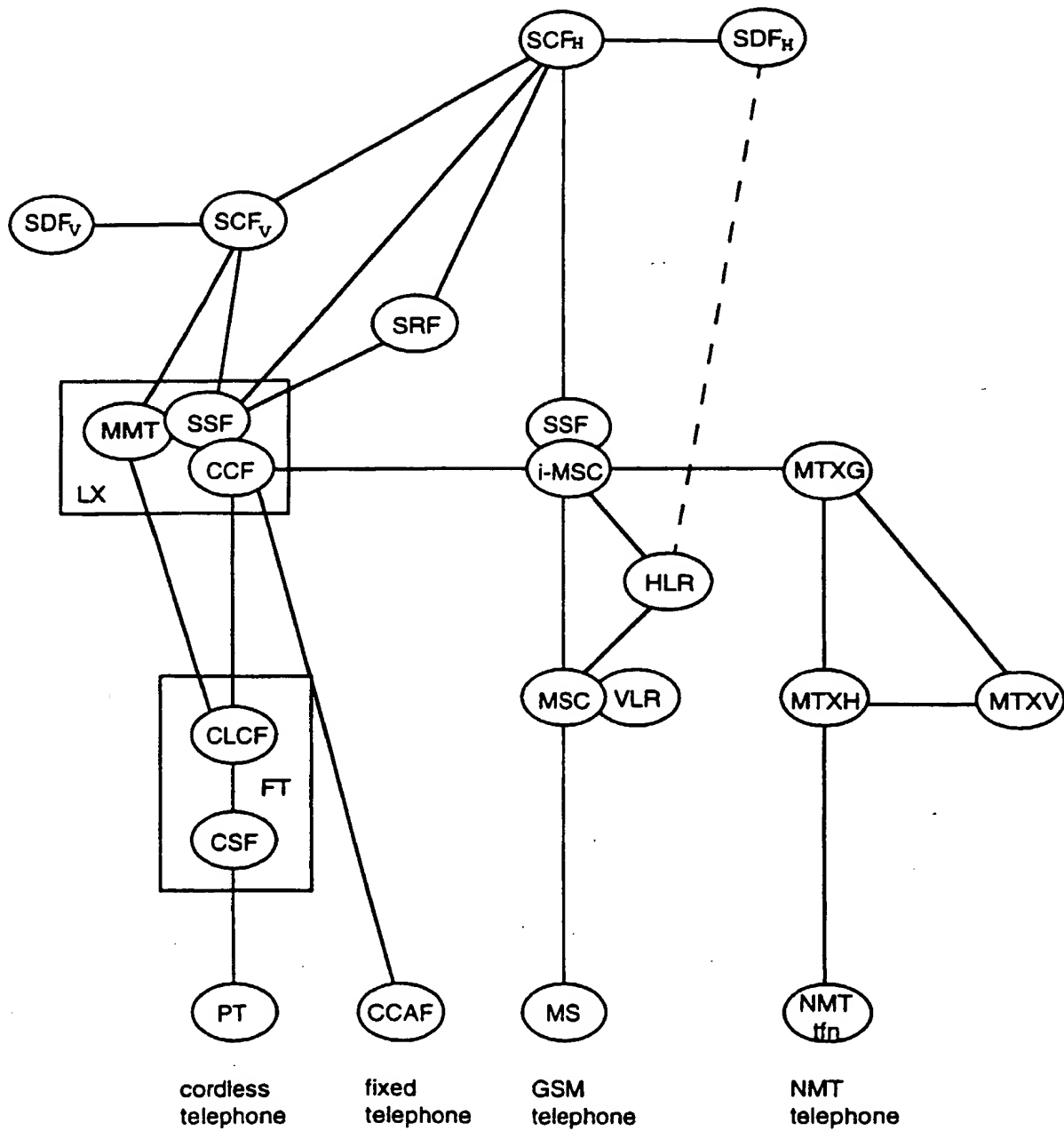


Figure 2



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